

IN THE CLAIMS

1. (Currently amended) A method for building a failover-enabled communications link, comprising:

assigning receiving, by a first Fibre Channel (FC) storage device, input of a plurality of upper-level addresses, based on an upper-level protocol, assigned to a FC port of the first FC first Fibre Channel (FC) node storage device in a communications system, the first FC node storage device supporting the FC protocol at a base layer, wherein assigning the plurality of upper-level addresses comprises encoding the plurality of upper-level addresses within a symbolic name of the first FC node device, wherein the plurality of upper-level addresses includes a primary address and a backup address, wherein the backup address is associated with a second FC node storage device; and

registering, by the first FC storage device, a symbolic name for the FC port of the first FC storage device with a name server, wherein the symbolic name is encoded with the primary address, and encoded with the backup address associated with the second FC storage device; and

in response to detecting, by the first FC storage device, a link failure of between the second FC node storage device and a third FC storage device, linking, by the first FC storage device, the FC port of the first FC storage device over a fabric network to the third FC storage device using the symbolic name registered with the name server and encoded with configuring each FC node device in the communications system to resolve the backup address associated with the second FC storage device into an address of the first FC node device based on the FC protocol.

2. (Previously Presented) The method of claim 1, wherein the upper-level protocol is a network protocol.

3. (Original) The method of claim 2, wherein the network protocol is the Transmission Control Protocol over the Internet Protocol (TCP/IP), and the upper-level addresses are IP addresses.

4. (Currently amended) The method of claim 1, wherein ~~the symbolic name is encoded~~with the primary address and backup address plurality of upper-level addresses within the symbolic name of the first FC node device is based on a predefined encoding scheme.
5. (Currently amended) The method of claim 4, wherein the predefined encoding scheme includes using selected bytes ~~in a~~in the symbolic name field defined in the FC protocol to store the ~~primary address and backup address plurality of upper-level addresses~~.
6. (Currently amended) The method of claim 1, wherein ~~registering the symbolic name for the FC port of the first configuring each FC node storage device with the name server~~ comprises:
 ~~configuring the FC node device to sending a RFT_ID message to a~~the name server for a FC fabric that enables communications between the FC ~~node storage~~storage devices[.]; and
 ~~to sending a RSPN_ID message to the name server.~~
7. (Currently amended) The method of claim [[6]]1, wherein ~~linking the FC port of the first FC storage device over a fabric network to the third configuring each FC node storage device~~ comprises[.];
 ~~configuring the FC node device to sending, by the third FC storage device, a GID_FT message to the name server[.];~~
 ~~to sending a GSPN_ID message to the name server for each port identified in a response to the GID_FT message[.]]~~received from the name server;
 ~~to compare[[e]]ing the upper-level address with the addresses encoded in a symbolic name received in response to the GSPN_ID message[.]]~~from the name server; and
 ~~to mapping the upper-level address to a port ID of the FC node device that has the upper-level address encoded in its symbolic name.~~
- 8-20. (Canceled)
21. (Currently amended) A storage device, comprising:
 a processor;

a memory coupled to the processor, the memory storing instructions which when executed by the processor cause the storage device to perform a method comprising:

receiving input of a plurality of IP addresses to be associated with a first Fibre Channel (FC) N_Port of the storage device, the storage device supporting the FC protocol at a base layer, wherein the plurality of IP addresses includes a primary IP address and a backup IP address, wherein the backup IP address is associated with a second FC N_Port on a second storage device; and

registering, with a name server, storing the plurality of IP addresses as a symbolic name for the first FC N_Port of the storage device within a symbolic name field for the first FC N_Port, wherein the symbolic name is encoded with plurality of IP addresses includes a the primary IP address, and [[a]] encoded with the backup IP address associated with [[a]] the second FC N_Port on the second storage device; and

in response to detecting a link failure between the second storage device and a third storage device, linking the first FC N_Port of the storage device over a fabric network to the third storage device using the symbolic name registered with the name server and encoded with the backup IP address associated with the second FC N_Port on the second storage device.

22. (Currently amended) The storage device of claim 21, wherein the method further comprises registering performing a registration procedure to register the symbolic name, and each communications protocol supported by the first FC N_Port with [[a]] the name server for the a FC fabric to which the first FC N_Port is connected.

23. (Currently amended) The storage device of claim ~~[[22]]~~21, wherein registering with the name server the symbolic name encoded with a primary IP address, and a backup IP address associated with a second FC N_Port on a second storage device ~~the registration procedure~~ comprises a first registration operation to register the primary IP address, and a second registration operation to register the backup IP address.

24. (Original) The storage device of claim 23, wherein the first registration operation and the second registration operation are the same registration operation.

25. (Original) The storage device of claim 23, wherein the method further comprises detecting a failure of a primary link between a pair of remote N_Ports, wherein one of the remote N_Ports has the backup IP address as a primary IP address.

26. (Original) The storage device of claim 25, wherein the second registration operation is performed after detecting the failure.

27. (Currently amended) A computer readable storage medium, having stored thereon on a sequence of instructions which when executed by a processor for a storage device, causes the storage device to perform a method comprising:

receiving input of a plurality of IP addresses to be associated with a first Fibre Channel (FC) N_Port of the storage device, the storage device supporting the FC protocol at a base layer, wherein the plurality of IP addresses includes a primary IP address and a backup IP address, wherein the backup IP address is associated with a second FC N_Port on a second storage device; and

registering, with a name server, storing the plurality of IP addresses as a symbolic name for the first FC N_Port of the storage device within a symbolic name field ~~for the first FC N_Port~~, wherein the symbolic name is encoded with the plurality of IP addresses includes a primary IP address, and [[a]] encoded with the backup IP address, wherein the backup IP address is associated with [[a]] the second FC N_Port on the second storage device; and

in response to detecting a link failure between the second storage device and a third storage device, linking the first FC N_Port of the storage device over a fabric network to the third storage device using the symbolic name registered with the name server and encoded with the backup IP address associated with the second FC N_Port on the second storage device.

28. (Currently amended) The computer readable storage medium of claim 27, wherein the method further comprises ~~registering performing a registration procedure in which the plurality of IP addresses and communications protocols supported by the first FC N_Port is registered~~ with [[a]] the name server for a FC fabric to which the first FC N_Port is connected.

29. (Currently amended) The computer readable storage medium of claim [[28]] 27, wherein registering with the name server the symbolic name encoded with a primary IP address, and a backup IP address associated with a second FC N_Port on a second storage device ~~the registration procedure~~ comprises a first registration operation to ~~registration~~ register the primary IP address and a second registration operation to register the backup IP address.

30. (Previously Presented) The computer readable storage medium of claim 29, wherein the first registration operation and the second registration operation are the same operation.

31. (Currently amended) The computer readable storage medium of claim 29, wherein the method further comprises detecting a failure of a primary link between a pair of remote N_Ports, wherein one of the remote N_Ports has the backup IP address as a primary IP address.

32. (Previously Presented) The computer readable storage medium of claim 31, wherein the second registration operation is performed after detecting the failure.